

**Patterns and Consequences of Nest-site Selection
by Ferruginous Pygmy-owls and Application
to Management Using Nest Boxes**

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Objectives

- Resources important in selection
- Resources important to reproductive performance
- Important spatial scales
- Application to nest-box program



Design

- Random and nonrandom surveys
- Paired samples
- Spatial scales nested hierarchically
 - Cavity
 - Substrate
 - Area
 - 15-, 30-, 90-m plots
- Two vegetation communities



Environmental Measurements I

Cavity Scale

- Entrance area
- Height
- Orientation
- Visibility
- Arm or Trunk
- Volume – Stem Bulge

Substrate Scale

- Height
- Diameter at breast height
- Upland or Riparian
- No. Arms
- No. Cavities



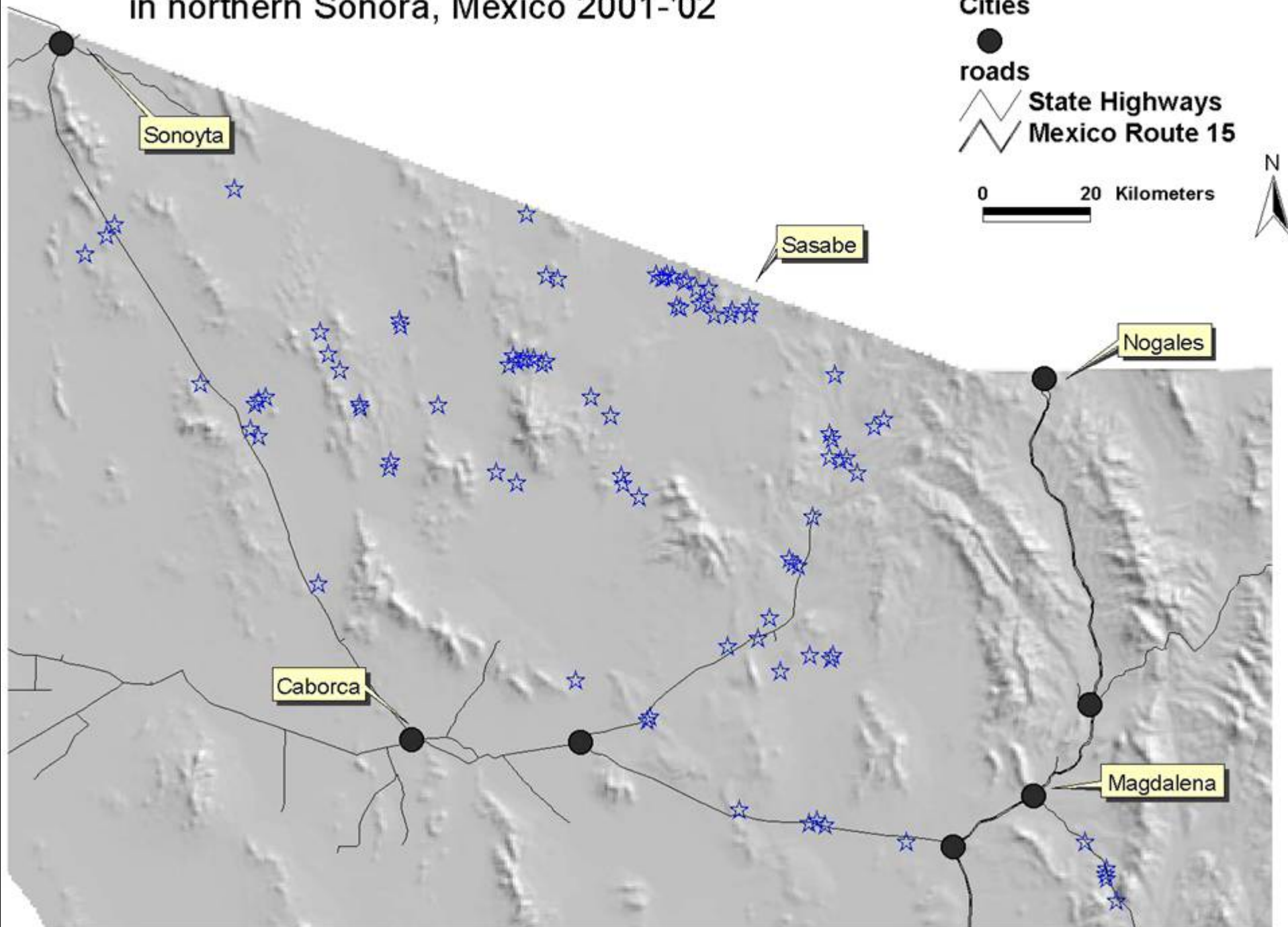
Environmental Measurements II

Area Scale

- Vegetation height, density, and volume
- Species composition
- Formation cover
- Distance to wash and vegetation edge



Distribution of ferruginous pygmy-owl nest sites in northern Sonora, Mexico 2001-'02



Selection - Cavity Scale

- Factors that explained selection
 - Entrance Area -
 - Cavity Volume +
 - Height +
 - Orientation



Selection - Substrate Scale

- Factors that explained selection
 - No. of Cavities +
 - No. of Arms +
 - Height +



Selection - Area Scale in Grasslands

- Factors that explained selection...

- **15-m Scale**

- Cavity density +
- Max. tree height +
- Saguaro volume +

- **30-m Scale**

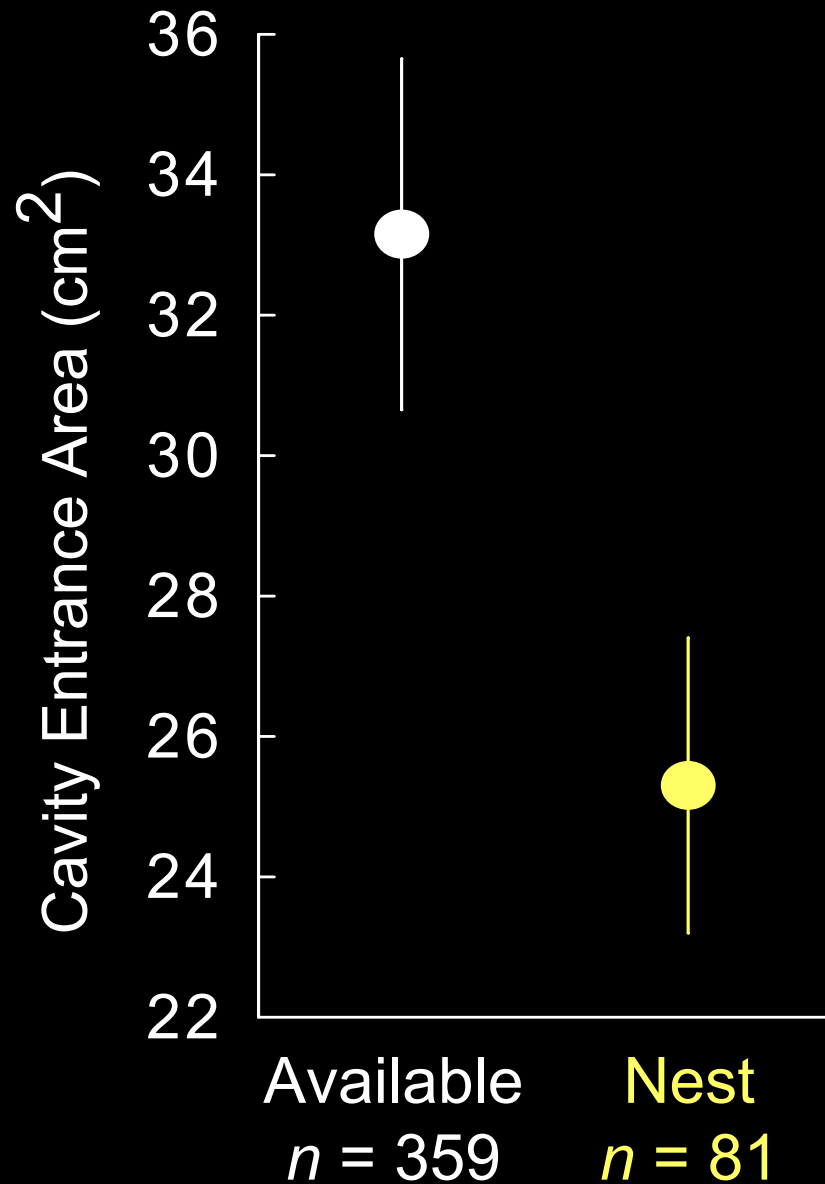
- Woodland cover +
- Saguaro volume +

- **90-m Scale**

- Vegetation volume 3 - 12 m +
- Desert hackberry volume +



Cavity Selection - Entrance Area



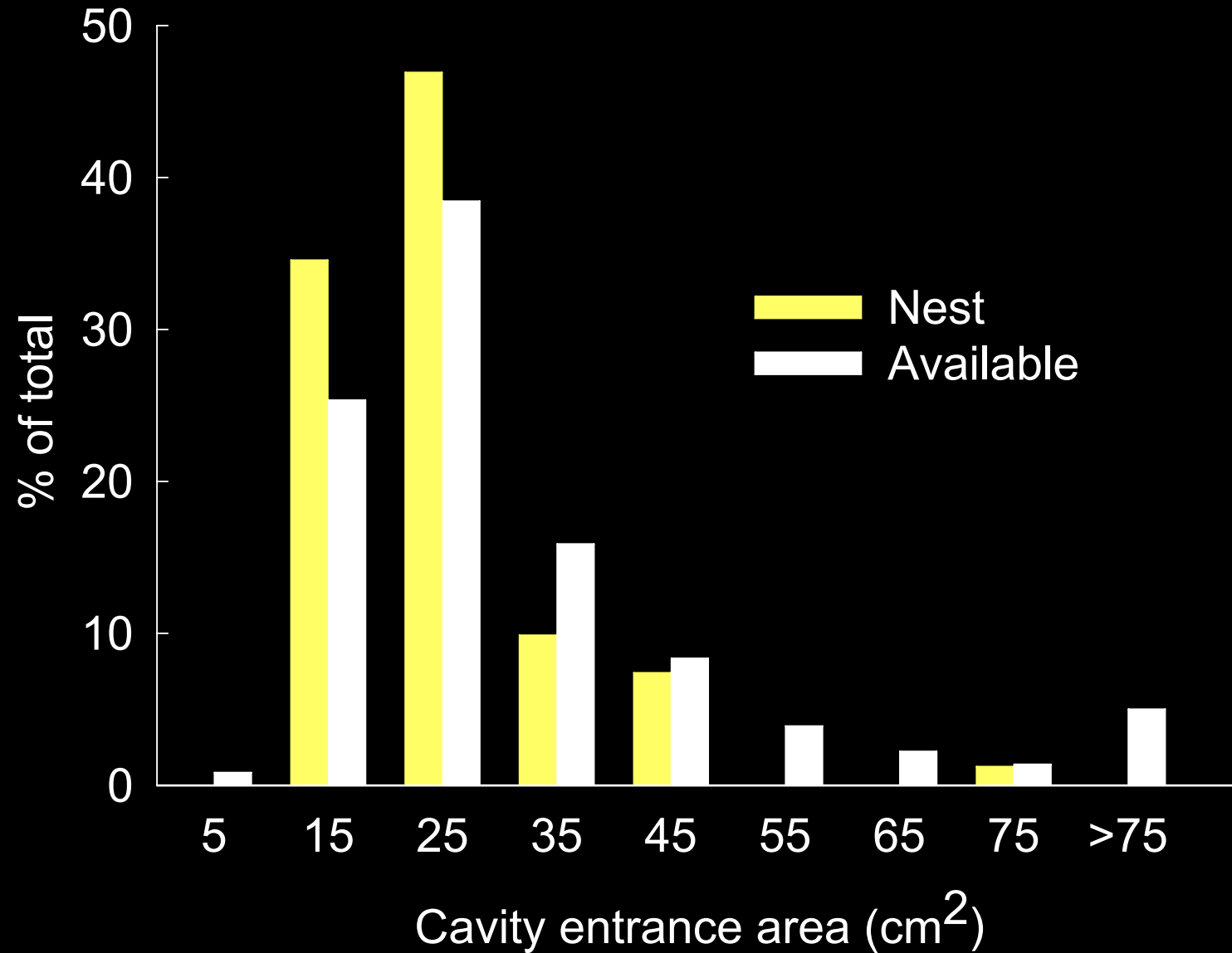
Odds = 0.94 $P = 0.0086$

Mean (range) diameter

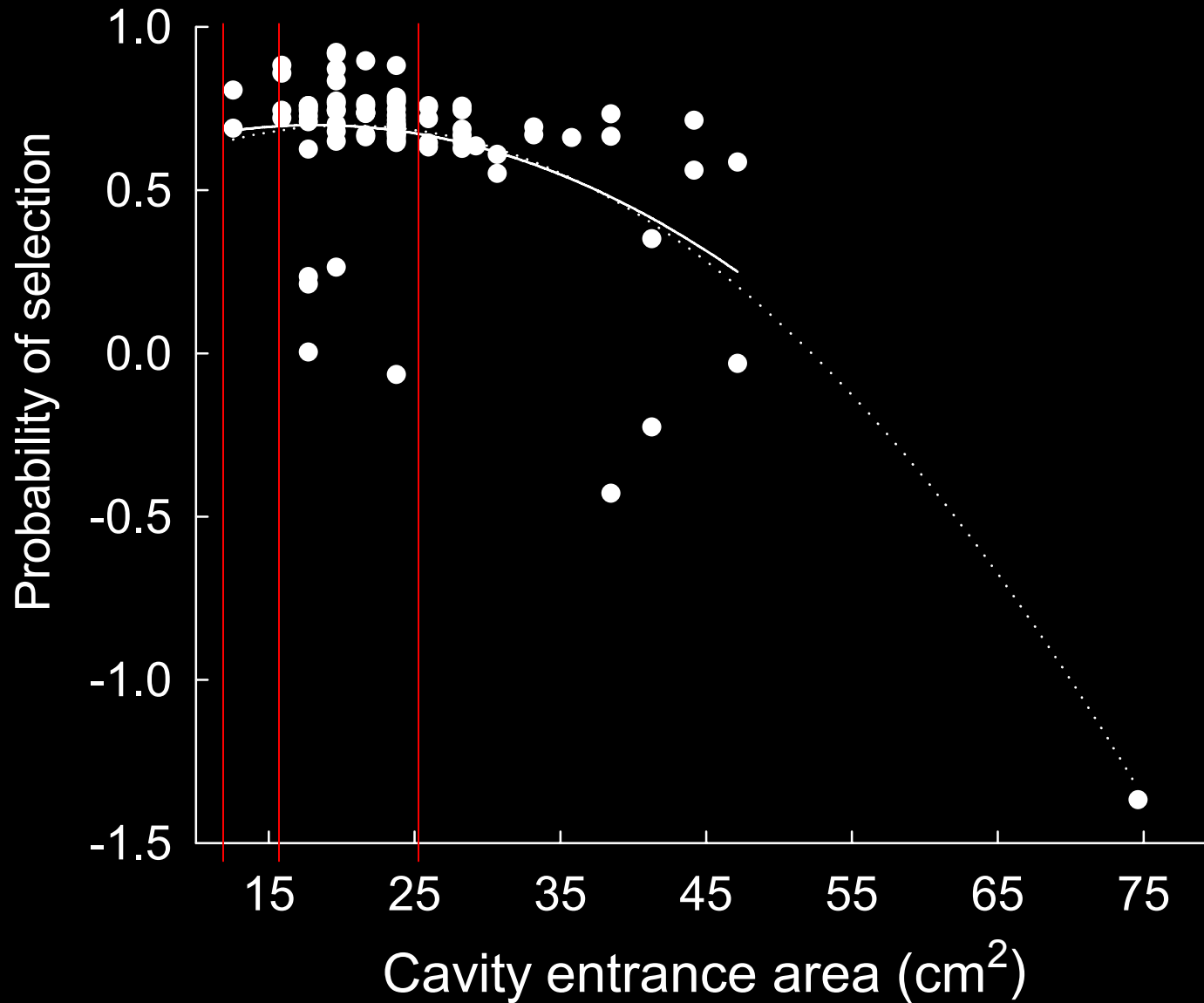
- vertical 5.5 cm (3.5-8.5)

- horizontal 5.8 cm (3.7-12.0)

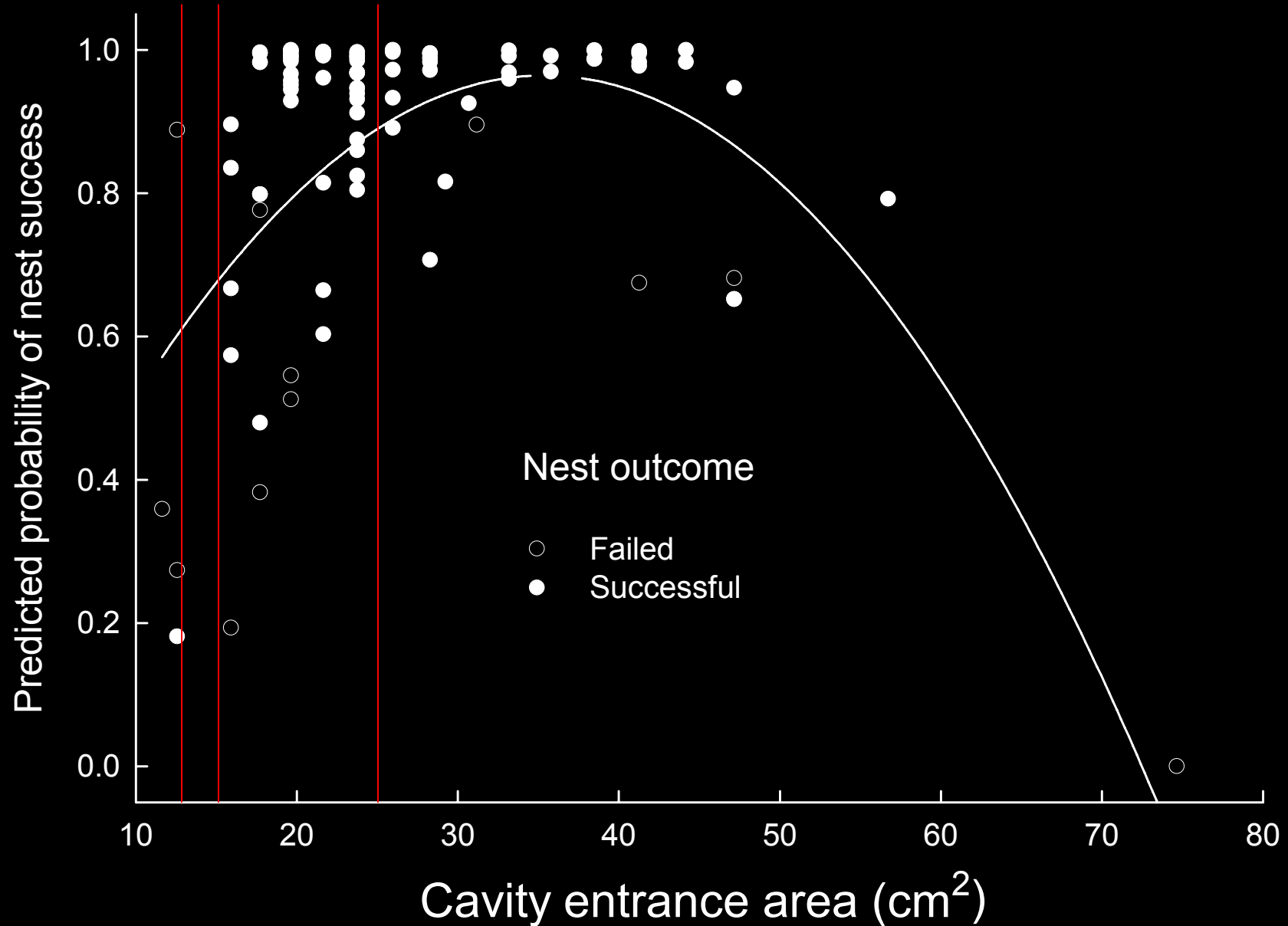
Cavity Selection - Entrance Area II



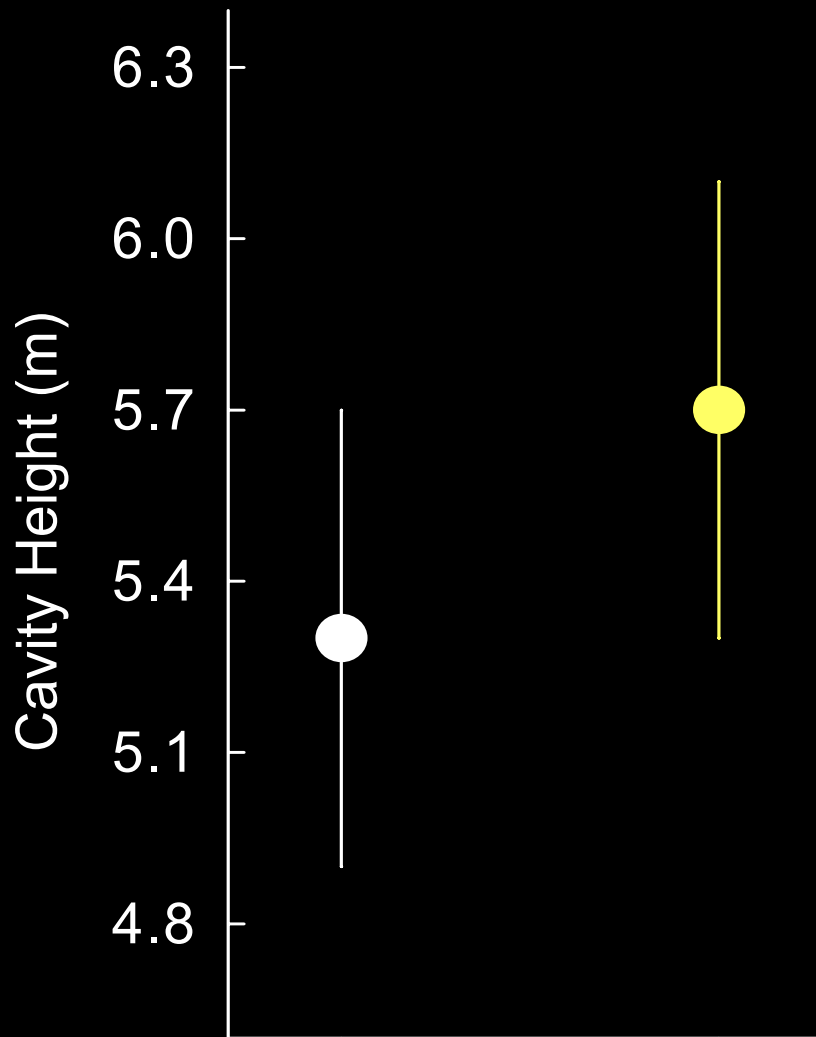
Cavity Selection - Entrance Area III



Reproductive Performance - Entrance Area



Cavity Selection – Height



Range = 2.9 - 9.6 m

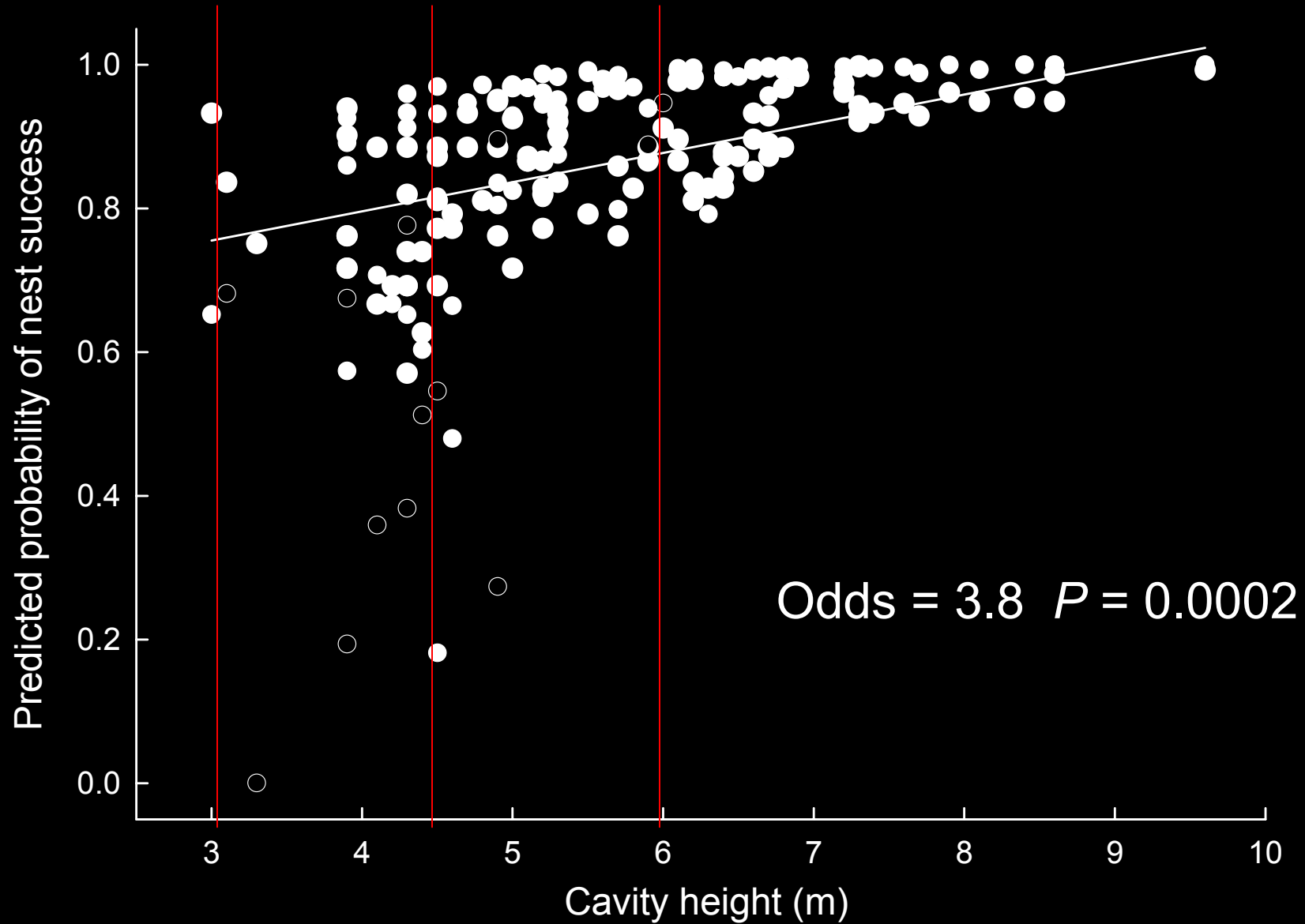
Odds = 1.4

$P = 0.046$

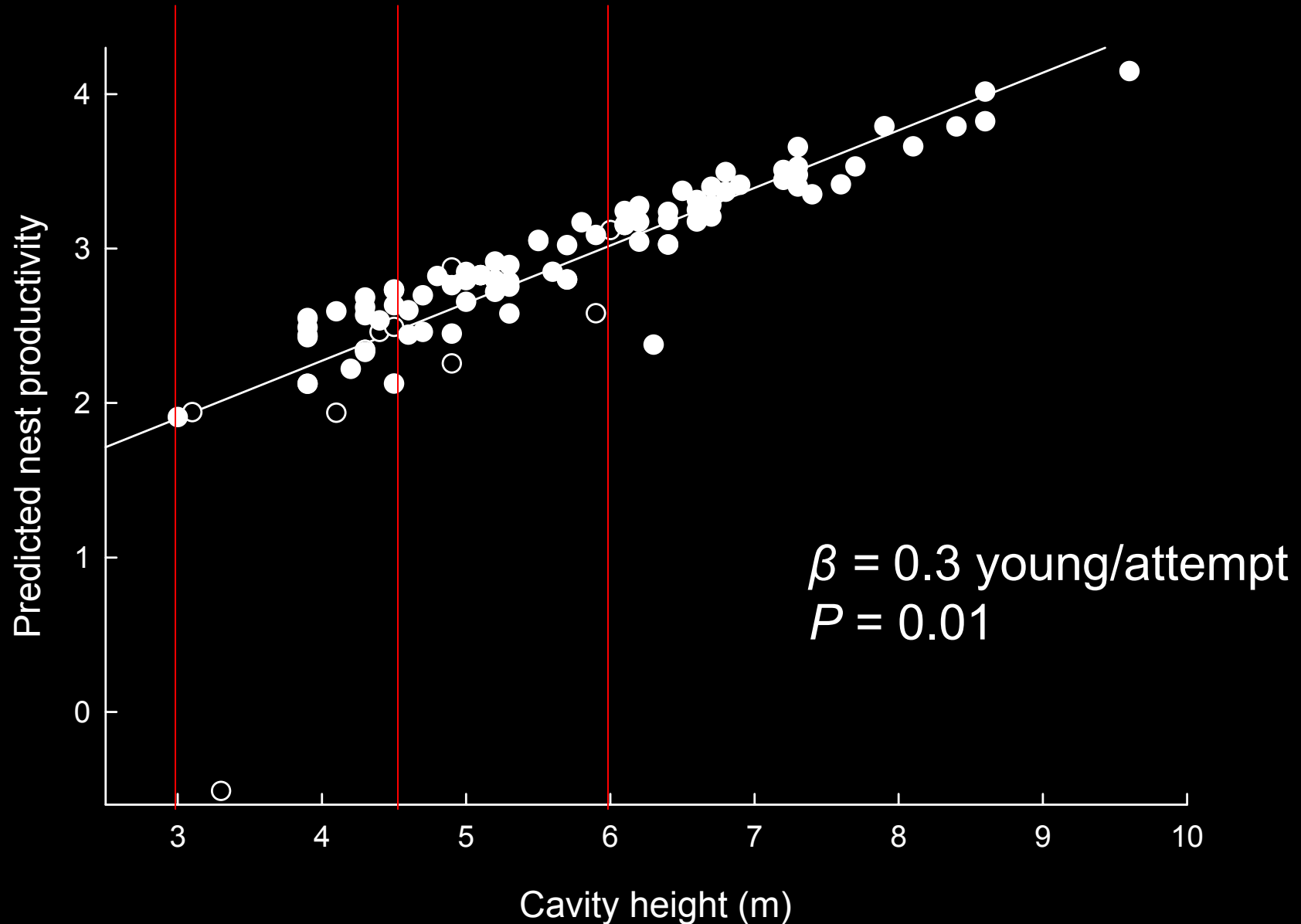
Available
 $n = 359$

Nest
 $n = 81$

Selection Consequences – Cavity Height I

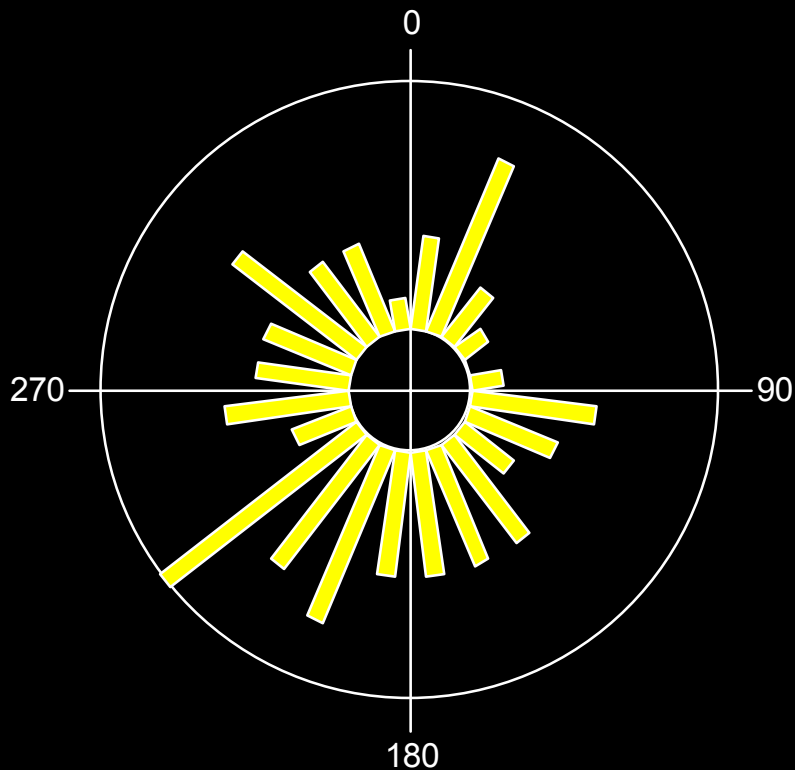


Reproductive Performance – Cavity Height II



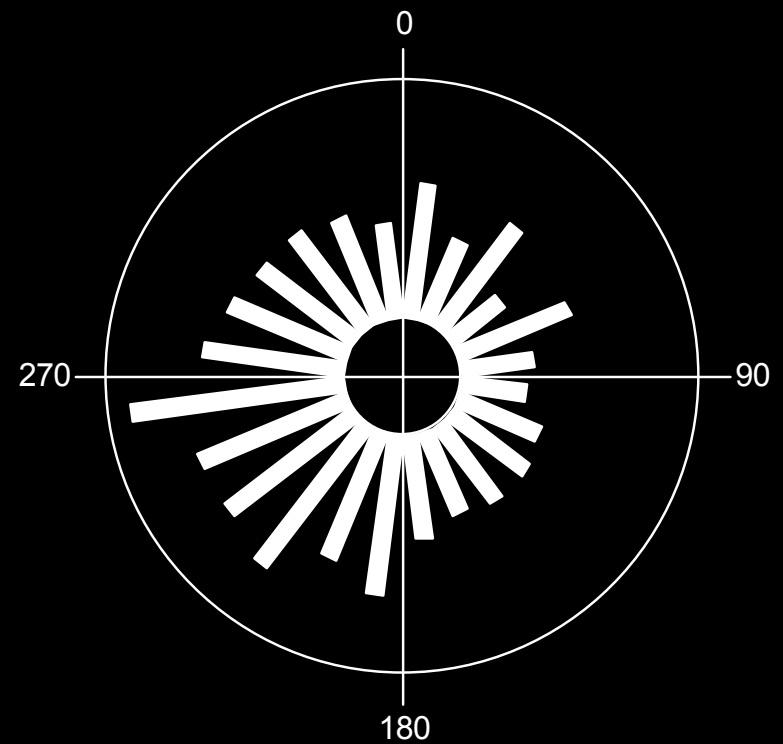
Cavity Selection – Orientation I

Nest



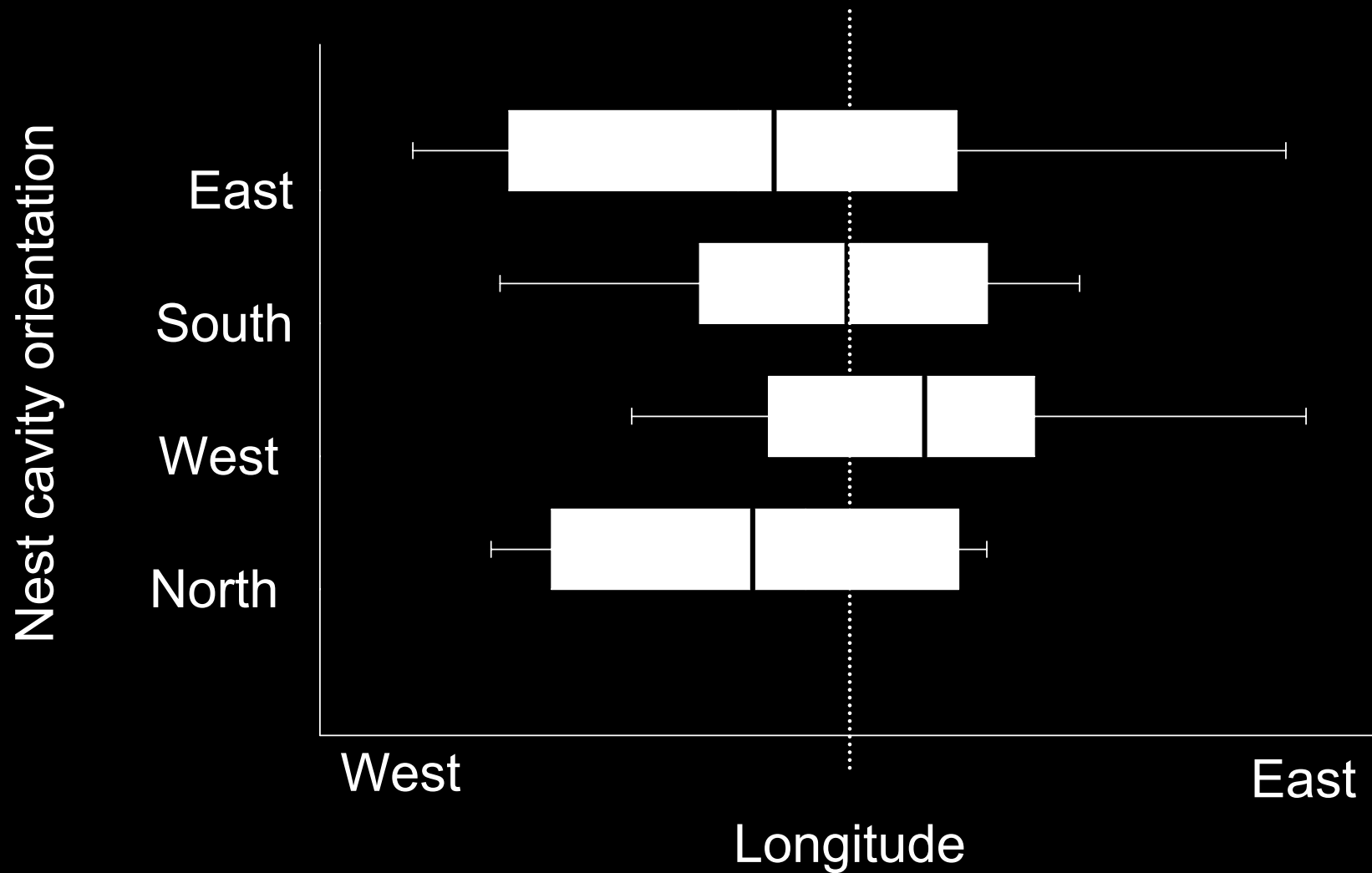
Mean = 224°

Available

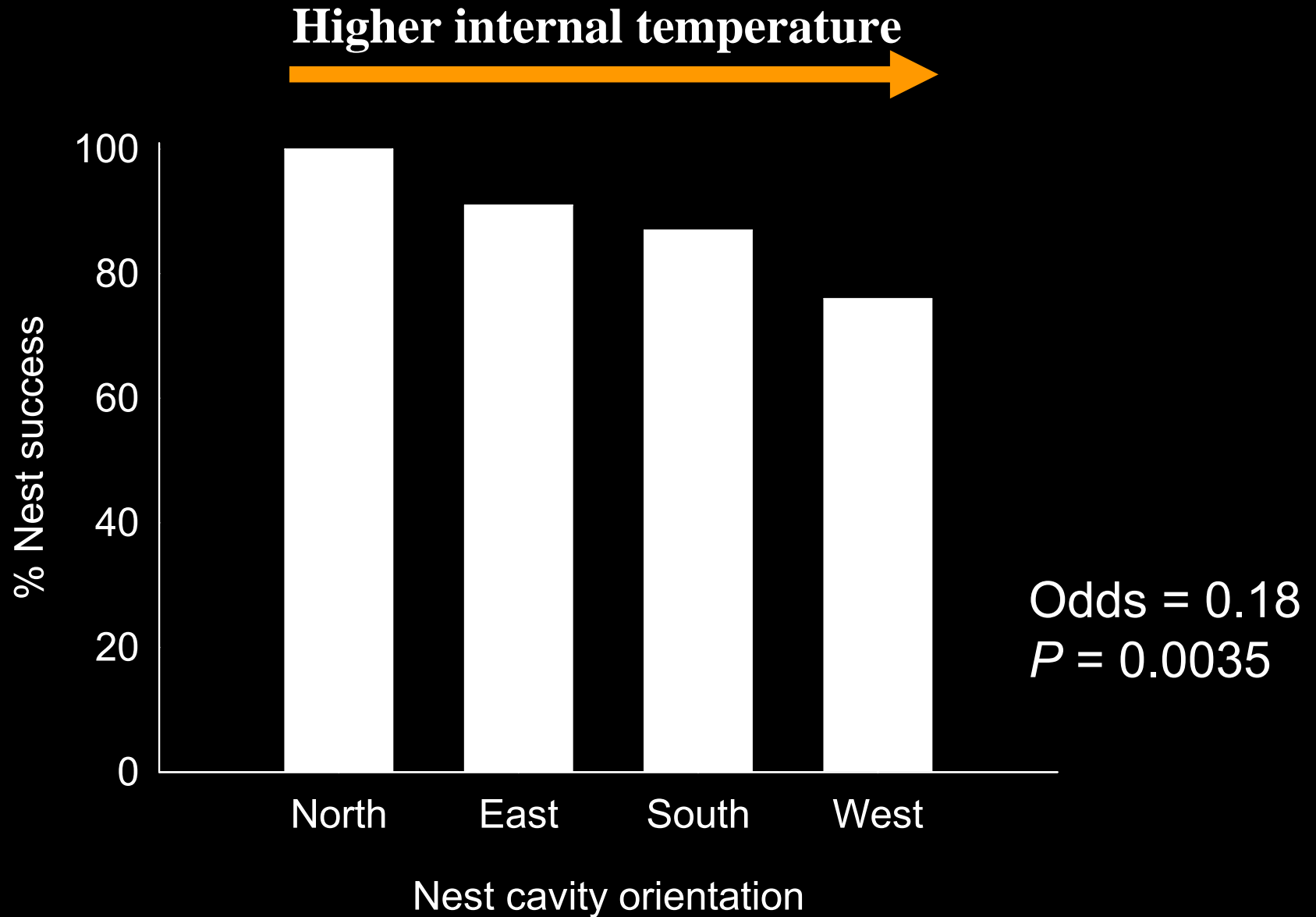


Mean = 253°

Cavity Selection – Orientation II



Reproductive Performance - Orientation



Reproductive Performance - Substrate Scale

- Factors that explained nest success and productivity
 - Height +



Nest Success - Area Scales

- Factors that explained nest success

Desertscrub

- 15 m

- Max. tree height +

- 30 m

- Max. tree height +

- 90 m

- Woodland cover +

Grasslands

No Factors $P < 0.25$

Nest Productivity - Area Scales

- Factors that explained Productivity

Desertscrub

- **15 m**

- Mean tree height +

- **30 m**

- Mean tree height +
- Total Veg. Volume \cap

- **90 m**

- Desertscrub cover -
- Total Veg. Volume \cap

Grasslands

- **15 m**

- Mesquite density +

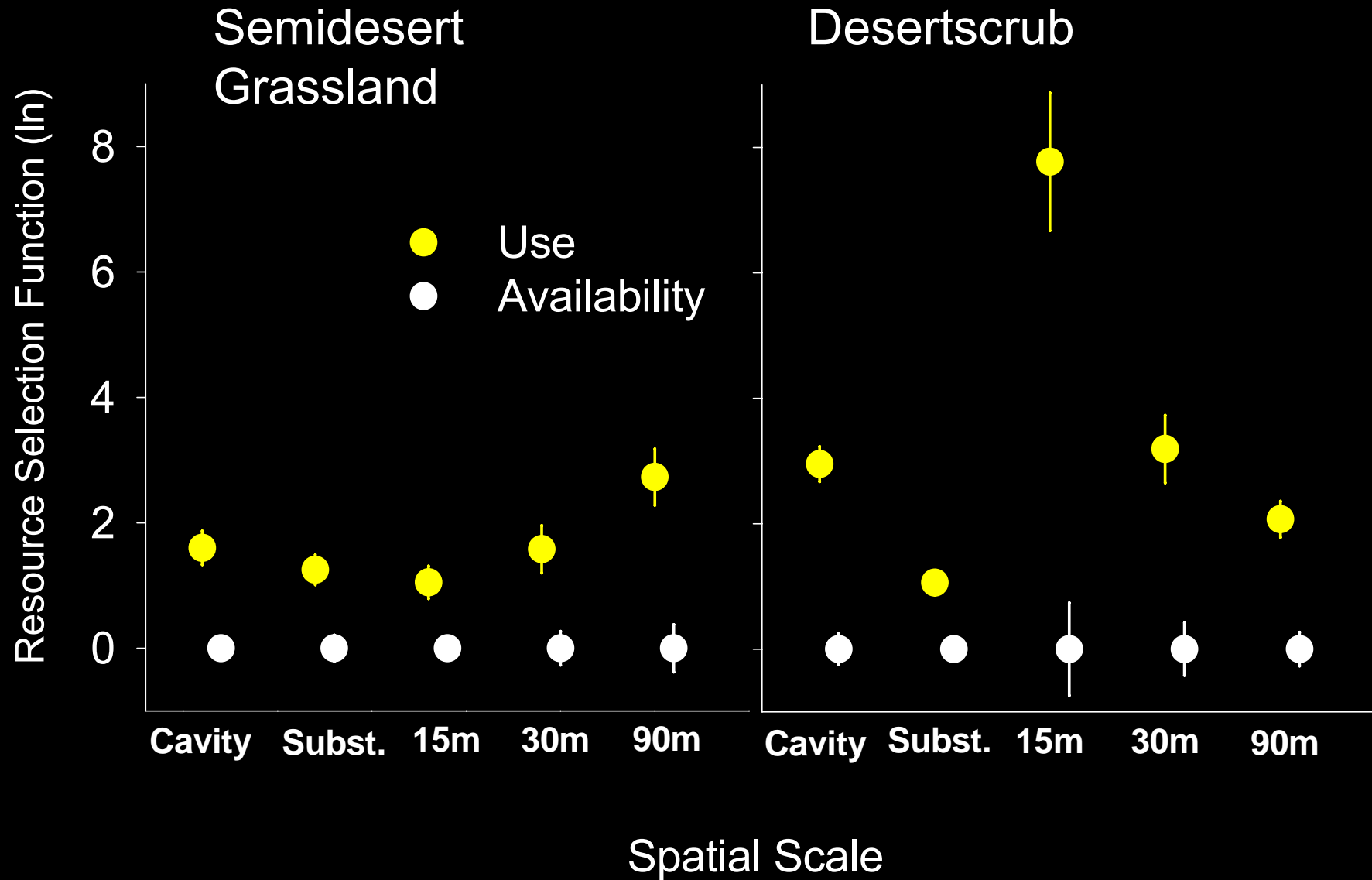
- **30 m**

- Veg. volume 1-3 m +

- **90 m**

- Veg. volume 3-6 m +

Magnitude of Selection



Conclusions

- Many resources important
- Resources important in selection also important to reproduction
- No efficient substitute for quantifying prescription
- Uncertainty - approach management as an experiment



N. Smith

Nest Boxes

- Spatial scales where owls most selective
- Focus on factors at cavity and large-area scales in grasslands
 - Orientation?
 - Shading and thermal issues
- Other issues
 - Distance, timing, fire, vandals



Thanks for your time

